REMARKS

Reconsideration of this application, based on this amendment and these following remarks, is respectfully requested.

Claims 1 through 7 and 11 through 15 remain in this case. Claims 1 through 7 and 13 through 15 are amended.

Applicant notes the indication by the Examiner that claims 2 and 13 through 15 are directed to allowable subject matter but remain objected to as dependent on a rejected claim. Claims 2 and 13 through 15 are amended to each be placed in independent form including the limitations of the claims upon which they depended, as suggested by the Examiner.

Applicant therefore respectfully submits that claims 2 and 13 through 15 are now in condition for allowance.

Claims 1, 3 through 6, 11, and 12 were rejected under §102(b) as anticipated by the Gitlin et al. reference[1]. Regarding claim 1, the Examiner asserted that the Gitlin et al. reference discloses the recited method steps at its column 2, line 31 through column 3, line 34, and column 7, lines 19 through 45. The reference was similarly applied against claims 3 and 4, and the Examiner further found that the reference teaches the splitting of the received signal into in-phase and quadrature-phase input signals. Regarding claims 5 and 6, the Examiner asserted that the Gitlin et al. reference discloses processing circuitry 833 that corresponds to the buffer manager of the claims, including the shifting of the coefficients within the filter buffer. And regarding claims 11 and 12, the Examiner applied the Gitlin et al. reference in the same manner as claim 5, but that the reference further teaches an A/D converter by way of its element 25 of Figure 1. In each case, the Examiner concluded that the Gitlin et al. reference anticipates claims 1, 3 through 6, 11, and 12.

[1] U.S. Patent No. 4,334,313, issued June 18, 1992 to Gitlin et al.

The Examiner rejected claim 7 under §103 as unpatentable over the Gitlin et al. reference. The Examiner asserted that the reference teaches all of the elements of claim 7 except for the data tracking buffer and the coefficient tracking buffer, but that it would have been obvious to provide these elements because every buffer has a pointer for pointing to a portion of a signal stored in its buffer. The claim was rejected accordingly.

Applicant first respectfully traverses the rejection of claims 11 and 12, on the grounds that the Gitlin et al. reference does not anticipate claim 11. Specifically, Applicant respectfully submits that the Gitlin et al. reference fails to disclose the tracking buffer of the claim, or the buffer management circuitry having the functions recited in claim 11.

Claim 11 in this application expressly recites that its tracking buffer has a length longer than the length of the sequence of filter coefficients used by the adaptive equalizer. There is simply no such tracking buffer disclosed by the Gitlin et al. reference.

More specifically, the Gitlin et al. reference discloses examples of its filter coefficients $C_1(m)$ through $C_{2M}(m)$,[2] thus numbering 2M coefficients. But the reference discloses that all 2M of these filter coefficients are used in the application of its transversal filters.[3] Therefore, the Gitlin et al. reference fails to disclose a tracking buffer that has a length longer than the sequence of filter coefficients used by an adaptive equalizer. Instead, the Gitlin et al. reference uses each of its stored coefficient values $C_1(m)$ through $C_{2M}(m)$ in its filter operations.

In addition, claim 11 recites that its buffer management circuitry shifts the position of the sequence of filter coefficients within the tracking buffer, so that those filter coefficients having the highest values are in a central portion of the sequence. The Gitlin et al. reference fails to disclose this shifting; instead, the Gitlin et al. reference discloses that, if the highest coefficient value is shifted from the center of its sequence, the receiver timing, or sampling phase, of the sampling and filtering operations is adjusted so that subsequent samples align

[2] Gitlin et al., *supra*, Figures 3, 4, and 6; column 8, line 25 through column 9, line 5.
[3] Gitlin et al., *supra*, column 6, line 33 through column 7, line 10 (the summation indices in each of the filter equations range from 1 to 2M).

with the center of the coefficient sequence, and so that the coefficients will then adapt in order to be centered as a result.[4]

Not only does the reference fail to disclose the shifting operation of the buffer management circuitry of claim 11, but in fact this shifting operation is impossible according to the Gitlin et al. reference. As mentioned above, each and every coefficient value in the Gitlin et al. reference is used in the filter operation. There are no excess buffer locations on either side of the plurality of filter coefficients that are used, and therefore there can be no shifting of the position of a sequence of filter coefficients within a tracking buffer according to the Gitlin et al. reference, because there is no "room" left within the buffer in which to make the shift. Rather, as mentioned above, the receiver timing is adjusted according to the Gitlin et al. teachings, so that the data values arrive earlier or later, and so that the filter coefficients eventually adapt to again be centered.

Applicant therefore respectfully submits that claim 11 is novel over the Gitlin et al. reference, because the reference fails to disclose the tracking buffer having the properties recited by claim 11, and because the reference fails to disclose the shifting function required of the buffer management circuitry in claim 11. For this reason, Applicants respectfully submits that claims 11 and 12 are novel over the Gitlin et al. reference.

Applicant further respectfully submits that claims 11 and 12 are patentably distinct over the Gitlin et al. reference. Nowhere does the reference, nor any of the other prior art of record in this case, disclose or suggest the use of a tracking buffer that is longer than the length of the sequence of coefficients used by the equalizer, as required by claim 11. Because of this, the Gitlin et al. reference teaches that the receiver timing must be adjusted in order to center the coefficient values in its filter.

In contrast, the receiver of claim 11 maintains accurate filtering even if some amount of timing drift occurs, without requiring the adjustment of receiver timing, such as adjustment of the sampling process. Indeed, it is contemplated by this invention that the length of the

[4] Gitlin et al., *supra*, column 8, lines 39 through 60.

tracking buffer may be selected so that any expected amount of drift over a transmission burst can be handled by the claimed receiver, without requiring adjustment of the receiver timing.[5] These advantages, which directly result from the differences between the claims and the prior art, further support the patentability of the claimed invention.

For these reasons, Applicant respectfully submits that claims 11 and 12 are not only novel, but are patentably distinct over the prior art of record in this case.

Claim 1 is amended to overcome the §102 rejection. Amended claim 1 now recites that the filtering of the digital signal is performed using a selected plurality of coefficients that correspond to a sequence of coefficient locations in a tracking buffer, where the tracking buffer has a larger number of coefficients than those used in the filtering step.[6] The claim also requires the step of determining a set of coefficient locations in the tracking buffer having the highest values, and selecting a shifted sequence of coefficient locations in the tracking buffer for the selected plurality of coefficients used in a repeated filtering step.[7] No new matter is presented by this amendment to claim 1, considering the ample support for each of its new and amended steps.

Similarly as discussed above relative to claim 11, Applicant respectfully submits that amended claim 1 is novel and patentably distinct over the Gitlin et al. reference.

As discussed above, the Gitlin et al. reference uses each of its $2M$ stored coefficients in its transversal filtering operations.[8] As such, nowhere does the reference anywhere disclose a tracking buffer that has a larger number of locations than the number of the coefficients used in the filtering of a received digital signal, as required by amended claim 1. And absent these teachings, the Gitlin et al. reference necessarily fails to disclose the selecting of a shifted sequence of coefficient locations in this tracking buffer, as required by amended claim 1. Indeed, as mentioned above, it is not possible to select a shifted sequence according to the Gitlin

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[5] *See* specification of S.N. 09/713,580, page 18, lines 4 through 17.
[6] *See* specification, *supra,* page 13, line 15 through page 14, line 15.
[7] *See* specification, *supra,* page 14, lines 16 through 20; page 16, line 15 through page 18, line 3.
[8] Gitlin et al., *supra,* column 6, line 33 through column 7, line 10.

et al. teachings, because there are no remaining coefficient locations into which to shift. Because of this, the Gitlin et al. reference teaches that the receiver timing must be adjusted in order for the coefficients to eventually (through adaptive updating) become centered again.

Applicant further respectfully submits that amended claim 1 is patentably distinct over the prior art of record in this case. Neither the Gitlin et al. reference nor any of the other prior art of record in this case disclose or suggest the filtering and selecting steps discussed above, which render the claim novel over the applied reference.

And as mentioned above, the method of claim 1 provides the important advantages mentioned above, in ensuring accurate adaptive equalizer filtering in the receipt of a digital signal despite timing drift. This method maintains accurate filtering without requiring adjustment in receiver timing, even over the span of a reasonable transmission burst. These advantages, which stem directly from the differences between claim 1 and the Gitlin et al. reference, further support the patentability of the claim over the prior art.

For these reasons, Applicant respectfully submits that amended claim 1 is novel and patentably distinct over the Gitlin et al. reference.

Claim 3 is similarly amended to overcome the §102 rejection. Amended claim 3 now recites that the filtering of an in-phase component of a digital signal is performed using a selected plurality of in-phase coefficients that correspond to a sequence of coefficient locations in an in-phase tracking buffer that has a larger number of coefficients than those used in the filtering.[9] The claim also requires the step of determining a set of coefficient locations in the in-phase tracking buffer having the highest values, and selecting a shifted sequence of coefficient locations in that buffer for use in a repeated filtering step.[10] No new matter is presented by this amendment to claim 3. Claim 4 is amended for consistency with claim 3, upon which it depends.

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[9] *See* specification, *supra*, page 13, line 15 through page 14, line 15.

[10] *See* specification, *supra*, page 14, lines 16 through 20; page 16, line 15 through page 18, line 3.

Similarly as discussed above relative to claims 1 and 11, Applicant respectfully submits that amended claims 3 and 4 are novel and patentably distinct over the Gitlin et al. reference.

As discussed above, because the Gitlin et al. reference uses each of its stored coefficients in its transversal filtering,[11] the reference necessarily fails to disclose any tracking buffer that has a larger number of locations than the number of the coefficients used in the filtering of a received digital signal, as required of the in-phase tracking buffer of amended claim 3. The reference also fails to disclose the selecting of a shifted sequence of in-phase coefficients; rather, the reference teaches the adjusting of its receiver timing in order to center the coefficients. As mentioned above, all of the coefficient values in the filtering according to the reference, and therefore its system cannot shift to select other (previously unused) coefficients, because there are none.

Applicant further respectfully submits that there is no suggestion from the Gitlin et al. reference nor from any of the other prior art of record in this case, to modify the teachings of the Gitlin et al. reference in order to provide the filtering and selecting steps required by claims 3 and 4. The important advantages mentioned above also result from the method of claims 3 and 4. Specifically, the inventive method of these claims ensure accurate adaptive equalizer filtering in the receipt of a digital signal having in-phase and quadrature-phase components, even if timing drift is present, without requiring the receiver timing to be adjusted as in the Gitlin et al. reference. Because these advantages directly result from the differences between the claims and the prior art, Applicant respectfully submits that claims 3 and 4 in this case are further patentable over this prior art.

For these reasons, Applicant respectfully submits that amended claims 3 and 4 are novel and patentably distinct over the Gitlin et al. reference.

Claim 5 is also amended to overcome the §102 rejection.

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[11] Gitlin et al., *supra*, column 6, line 33 through column 7, line 10.

Amended claim 5 now recites a tracking buffer having a plurality of coefficient locations defining a length of the tracking buffer, the tracking buffer for storing a plurality of equalizer coefficients in a sequence of coefficient locations that is shorter than the length of the tracking buffer, the plurality of equalizer coefficients to be applied to said equalizer. The timing recovery device of claim 5 also requires a buffer manager for tracking the contents of the coefficient locations within the tracking buffer, and for shifting the sequence of coefficient locations in the tracking buffer to be applied as the plurality of equalizer coefficients responsive to shifts, within the tracking buffer, of a set of coefficient locations having the highest coefficient values. This claimed device provides the important advantages discussed above relative to the other claims, namely in compensating for timing drift while still maintaining excellent adaptive equalizer performance, and without requiring the adjustment of the receiver timing and sampling phase.

Claims 6 and 7 are amended for consistency with amended claim 5, upon which they depend.

Claim 5 requires that the length of the sequence of filter coefficients used by the equalizer is shorter than the tracking buffer. This relationship between the filter coefficients and a buffer is not taught by the Gitlin et al. reference. As discussed above repeatedly, the filter coefficients $C_1(m)$ through $C_{2M}(m)$ of the Gitlin et al. reference are all used in each application of its transversal filter. There is no tracking buffer that has a length longer than the sequence of filter coefficients used by the Gitlin et al. equalizer. Accordingly, the tracking buffer of amended claim 5 is not taught by the Gitlin et al. reference.

Amended claim 5 also requires that its buffer manager shift the sequence of coefficient locations in the tracking buffer to be applied as the plurality of equalizer coefficients responsive to shifts, within the tracking buffer, of a set of coefficient locations having the highest coefficient values. The Gitlin et al. reference fails to disclose any circuit for performing such shifting. As discussed above, the Gitlin et al. reference instead discloses the adjusting of its receiver timing or sampling phase in response to the highest coefficient value drifting from the center of the filter sequence. In fact, it is impossible for the Gitlin et al. receiver to perform the shift recited in

amended claim 5, because there is no tracking buffer that is longer than the set of coefficients used in the filtering. The recited shifting is therefore not possible according to the Gitlin et al. teachings.

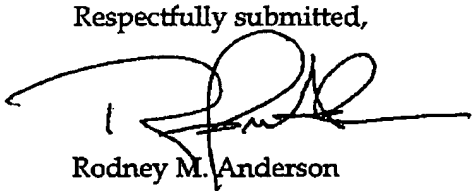
And nowhere does the Gitlin et al. reference, nor any of the other prior art of record in this case, provide any disclosure of such a tracking buffer and its shifting, nor suggest the modification of the Gitlin et al. teachings to provide these elements. The important advantages provided by the timing recovery device of claims 5 through 7 also support the patentability of these claims, considering that these advantages are the direct result of the difference between the claims and the prior art.

Applicant therefore respectfully submits that amended claims 5 through 7 are novel and patentably distinct over the prior art of record in this case.

For all of these reasons, Applicant respectfully submits that all of the claims in this case are novel and patentably distinct over the Gitlin et al. reference, as well as the other prior art of record in this case.

Applicant respectfully submits that all claims now in this case are in condition for allowance. Reconsideration of this application is therefore respectfully requested.

Respectfully submitted,



Rodney M. Anderson
Registry No. 31,939
Attorney for Applicant

Anderson, Levine & Lintel, L.L.P.
14785 Preston Road, Suite 650
Dallas, Texas 75254
(972) 664-9554

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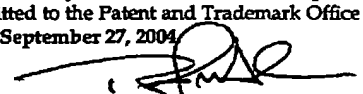

Rodney M. Anderson
Registry No. 31,939